



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/509,303

06/22/2005

Satoshi Aoki

7272-137/10410482

5421

167 7590 06/25/2008  
FULBRIGHT AND JAWORSKI LLP  
555 S. FLOWER STREET, 41ST FLOOR  
LOS ANGELES, CA 90071

EXAMINER

GARDNER, SHANNON M

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

06/25/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/509,303	<b>Applicant(s)</b> AOKI, SATOSHI	
	<b>Examiner</b> SHANNON GARDNER	<b>Art Unit</b> 4132	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-4, 6, 8 and 10 is/are pending in the application.
- 4a) Of the above claim(s) 4, 8 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-3, 6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/24/2004</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group I (claims 2-3 and 6) in the reply filed on 5/22/2008 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 requires that the "aqueous solution is stirred all for the first, second and third steps" in the third line of the claim. It is unclear as to what Applicant intends by this limitation. For the purposes of this action, the claim has been interpreted as both *continuous* stirring throughout the first, second and third steps; as well as having an initial stirring step followed by the subsequent first, second and third steps. Rejections have been applied for both interpretations below. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 2-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakada et al. (*High-Efficiency Cadmium-free Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells with Chemically Deposited ZnS Buffer Layers*).

As to claim 2, Nakada is directed to a method of fabricating a thin-film compound solar cell having (abstract, also see Figure 2):

- An n-type buffer layer (ZnS, see Introduction pp 2093) formed therein for providing a heterojunction with a p-type semiconductor light absorbing layer (CIGS layer) (pp 2094, section II (B)) formed on a back electrode (Mo-coated SLG) (pp 2094, section II (B)) wherein,
- The buffer layer is formed on the light absorbing layer by chemical bath deposition (CBD) process using an aqueous solution for dipping therein a surface of the light absorbing layer (pp 2093, section II (A)) wherein the CBD process comprises:
  - A first step of holding the solution with the light absorbing layer surface dipped therein at a first preset temperature for a first preset time (room temperature) (pp 2093, section II (A)),

- A second step of heating the solution for a second preset time to a second temperature higher than the first temperature (pp 2093, section II (A)) and
- A third step of holding the solution at the second temperature for a third preset time (80°C) (pp 2093, section II (A)).

Nakada teaches the aqueous CBD solution's temperature rising from room temperature to 80°C (pp 2093, section II (A)). During this temperature rise, there will be an intermediate temperature reached at some time that will be higher than the first temperature. The time at which the CBD begins reads on the instant first preset time, the time at which CBD is concluded reads on the instant third preset time, and the time at which the intermediate temperature is reached reads on the instant second preset time.

Regarding claim 3, the reference teaches the aqueous solution being stirred for the first, second and third steps (pp 2093, section II (A)).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 4132

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakada et al. as applied to claim 1 above, and further in view of Dona et al (*Chemical Bath Deposition of CdS Thin Films: An Approach to the Chemical Mechanism Through Study of the Film Microstructure*).

Regarding claim 3, Applicant is directed above for a full discussion of Nakada as applied to claim 2. Should claim 3 be interpreted as the aqueous solution being stirred continuously throughout the three steps, then though Nakada teaches using a magnetic stirrer to mix the aqueous CBD solution (pp 2093, section II (A)), the reference is silent as to the aqueous solution being stirred throughout the first, second, and third steps.

However, it is known in the chemical bath deposition art to continuously stir the aqueous solution (by magnetic stirrer) in order to avoid concentration gradients in the solution, as taught by Dona (pp 4082, column 2, 2<sup>nd</sup> paragraph).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to continue to stir the aqueous CBD solution taught by Nakada in order to avoid concentration gradients, as taught by Dona.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakada et al. as applied to claim 2 above, and further in view of Hashimoto et al (*Chemical bath deposition of CdS buffer layer for CIGS solar cells*).

Regarding claim 6, Applicant is directed above for a full discussion of Nakada as applied to claim 2. Nakada is silent as to the pH value of the aqueous solution being regulated to a higher value in the third step.

However, it is known in the chemical bath deposition art to increase the pH value of the aqueous CBD solution in order to adjust the size of the particles being formed, as taught by Hashimoto (see Abstract and Summary).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to increase the pH of the aqueous solution of Nakada in order to adjust the size of the particles being formed, as taught by Hashimoto.

### ***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamaguchi et al teaches the chemical bath deposition of indium sulfide thin films from aqueous mixtures under conditions at 30°C and 70°C, and further discusses the difference in particle size at each set of conditions. Mickelsen et al (US 4335266) teaches the benefit of a graded p-type layer in a p-n type heterojunction in relation to energy conversion.

### ***Contact/Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHANNON GARDNER whose telephone number is (571)270-5270. The examiner can normally be reached on Monday to Thursday, 8am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571.272.1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. G./  
Examiner, Art Unit 4132

/Jessica L. Ward/  
Supervisory Patent Examiner, Art Unit 4132